METHOD OF CONSTRUCTING A BIOSENSOR

BACKGROUND OF THE INVENTION

In the design and manufacture of an indwelling glucose sensor, a problem has been encountered in the application of viscous liquid layers of material, which are then cured, over the electrochemically active (platinum) surface. It is desirable to have an active surface area that is on the order of about a square millimeter. Unfortunately, when dip coating viscous liquids onto this relatively large area, it has been quite difficult to construct a coating having a thickness sufficient to produce an adequate response to the presence of glucose.

SUMMARY OF THE INVENTION

In a first separate aspect, the present invention is an indwelling analyte sensor that has an active sensing region. This sensing region includes an electrochemically active surface and a membrane system that adheres to the electrochemically active surface. In addition, at least one nub of dielectric material extends outwardly from the electrochemically active surface and serves as a supportive structure to the membrane system.

In a second separate aspect, the present invention is a method of creating an analyte sensor. The method starts with the step of providing an electrochemically active surface. Then, at least one nub made of dielectric material and extending transversely outwardly from the electrochemically active surface is created. A curable liquid is applied to the electrochemically active surface and is then cured. In this

process, the nub, which could be one of several nubs, serves to support the liquid before and during the curing.

The foregoing and other objectives, features and advantages of the invention will be more readily understood upon consideration of the following detailed description of the preferred embodiment(s), taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of a work piece formed as part of the construction of a biosensor using the method of the present invention.

FIG. 2 is a side view of a sensor constructed from the work piece of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

In a preferred embodiment of an analyte (typically glucose) sensor 10 (FIG.2) a 178 micron thick platinum wire 12 is coated with a 25 micron thick polyimide layer 14. A silver wire 16 is wrapped about a portion of layer 14. In addition, a stainless steel retractor lead 18 forms a portion of sensor 10.

Three cavities 20, each 2 mm long, are formed by laser ablating polyimide layer 14 to form a work piece 8 (FIG. 1). The polyimide between the cavities 20, forms a set of annular plates 22, that are supported by the adherence of the polyimide 14 onto wire 12. After this laser machining operation the work piece is ready to be dip coated with the material 24 that permits it to detect glucose. Typically, material 24 is comprised of a set of layers that are constructed through a sequence of dip coating operations interspersed with curing operations.

These layers typically include an interferent excluding layer, a glucose oxidase layer and a permselective layer as described in U.S. Patent 5,165,407, which is hereby incorporated by reference as if fully set forth herein. The surface of each viscous fluid tends to form a shape somewhat like a catenary curve between plates 22. Accordingly a greater portion of viscous fluid adheres than would adhere without the presence of plates 22. This greater thickness, especially for glucose oxidase layer is very important in the creation of a robust response to the presence of glucose and oxygen.

The terms and expressions that have been employed in the foregoing specification are used as terms of description and not of limitation. There is no intention, in the use of such terms and expressions, of excluding equivalents of the features shown and described or portions thereof, it being recognized that the scope of the invention is defined and limited only by the claims which follow.